

V. Statewide Wildlife Conservation Themes and Strategies

During the process of outlining and evaluating objectives for wildlife conservation in Georgia, several issues or themes pertaining to high priority species and habitats across the state or in several ecoregions were identified. These conservation themes are described below, and the highest priority specific conservation actions associated with each of these themes are listed.

Wildlife Conservation on Private Lands

Wildlife conservation tools include land protection action by a public agency or a private conservation organization as well as provision of technical assistance or financial assistance to landowners to improve or restore wildlife habitat or meet other natural resource objectives. An array of programs is available to private landowners to help them achieve these objectives. However, landowners sometimes fail to take advantage of these programs simply because it is difficult to determine eligibility, availability, or the relative benefits of one program versus another.

In 1995 WRD began its Private Lands Initiative to intensify efforts in promoting, encouraging, and providing technical assistance for wildlife management on private lands. The Private Lands Initiative developed a strategy for delivering technical assistance to private landowners through USDA programs authorized under the Farm Bill and by developing a partnership with corporate forest landowners known as the Forestry for Wildlife Partnership. In 1998 the Bobwhite Quail Initiative was developed and formed into a separate technical and financial assistance program in the upper Coastal Plain of Georgia. In 1999, the Forest Stewardship Program was incorporated into the Private Lands Initiative to create the Private Lands Program. This program strives to serve private landowners by incorporating the landowner's objectives for their land into a comprehensive wildlife management plan. Private Lands Program biologists provide information to landowners about federal and state natural resource programs that provide both technical and financial assistance. WRD biologists also work with these landowners to identify programs best suited to meet these objectives and the agencies that can provide help with enrollment.

The "Landowner's Guide to Conservation Incentives" developed and distributed by WRD staff as part of the CWCS planning effort provides information on a wide variety of programs that are available to Georgia residents. This booklet, an update and revision of a previous document entitled "Landowner's Guide to Conservation Options", serves as an introduction to program objectives, funding levels, eligibility, administering agencies, specific benefits to landowners, stipulations for continued support, and other elements. The document provides a matrix of programs and agencies, includes a glossary of program and agency acronyms, and categorizes incentive programs by type of assistance provided (e.g., direct payments, technical assistance, tax incentives, landowner recognition, regulatory relief). The "Landowner's Guide", which is included as Appendix N, is available from WRD offices in printed form and is also posted on the WRD website (www.georgiawildlife.com).

In addition to programs administered through the Farm Bill, there are numerous programs handled by other agencies and organizations, including non-governmental organizations (see Table 12). Some of these provide direct funding for land conservation, others provide technical assistance to landowners to achieve conservation goals, and still others provide public recognition for conservation successes. Funding levels, conservation emphasis, criteria for eligibility, and other elements of these programs vary over time, so periodic updates of the “Landowner’s Guide” will be necessary. In addition, public agencies should take advantage of opportunities to collaborate on projects that will focus financial and technical resources to provide the greatest benefit to habitats and species of greatest conservation need on private lands.

The primary emphasis in this document is the conservation of natural habitats. However, a number of high priority species make use of habitats that are created or maintained by human activities. These include field edges, utility rights of way, harvested timberlands, and fallow agricultural lands (“old fields”). These anthropogenic habitats resemble natural habitats that have been greatly diminished in the Georgia landscape through fire suppression, the loss of native grazers, or other factors. Numerous opportunities exist to provide assistance to private landowners to maintain and enhance early successional habitats through the Bobwhite Quail Initiative and various Farm Bill related programs. These programs provide means by which wildlife habitat can be improved with minimal impacts on ongoing agricultural or silvicultural operations.

In order to take advantage of these opportunities, WRD should continue to work with NRCS and other organizations to improve delivery of financial and technical assistance programs. By sharing resources and increasing the number of field staff, these organizations can significantly enhance the number and quality of wildlife conservation programs provided to private landowners. Similar efforts in Missouri and Kentucky have proven very successful and may serve as viable models for future efforts in Georgia.

Highest Priority Conservation Actions

Specific conservation actions that pertain to the enhancement of wildlife conservation practices on private lands and were rated “Very High” or “High” in priority are listed below. Information on lead organizations, partners, funding sources and other details for these and other recommended actions can be found in Appendix L.

- Coordinate utilization of and training for implementation of Georgia’s Best Management Practices for Agriculture, and improve wildlife conservation guidelines. Provide technical assistance and information to develop a wildlife conservation component for agricultural BMPs that addresses needs and opportunities for wildlife habitat protection.
- Develop habitat-specific management guidelines to address conservation needs of high priority species in each ecoregion of the state, and provide these to landowners and managers.

- Encourage use of prescribed fire as a habitat management tool on private lands. Provide information and technical assistance to landowners to encourage appropriate use of prescribed fire as a management tool to enhance and maintain wildlife habitats.

Old Field Habitats

Old-field is a habitat type most often found after abandonment of pastureland or retirement of crop fields. This habitat type includes a meadow stage and a shrub stage depending on the site's physical characteristics, time since abandonment, and disturbance regime. In its early stages, the site is usually in a meadow-like condition and is dominated by grasses and forbs. As the site ages shrubs and small trees become established and it becomes a shrubland. Eventually, in the absence of a disturbance like fire, the site would succeed into a woodland. While man-made, these habitats mimic many of the conditions found in open pine forest, natural grasslands, open shrublands, and savannas, and are used by an extensive array of wildlife species including many of conservation concern (e.g., Northern Bobwhite, Golden-winged Warbler, Loggerhead Shrike). In some cases natural disturbance regimes that would have created habitat for these rare species no longer operate on a landscape-level scale (e.g., fire) and creation, maintenance, and augmentation of man-made old field habitats is necessary to support, or at least enhance populations of many of these species.

Field borders and similar lands created through Farm Bill programs, the Bobwhite Quail Initiative, and similar programs often have these old field characteristics and provide suitable habitat for rare and declining species that in many cases have lost significant portions of their natural habitat. A good example of this is the Northern Bobwhite (quail) that at one time was a very common species throughout the expansive areas of Longleaf Pine-Wiregrass habitat in the Coastal Plain, and also occurred in significant numbers in natural grassland and recently burned areas throughout much of the state. With the loss of the majority of acreage in these habitat types, anthropogenic habitats like old fields have become increasingly important to the well being of quail and many associated species.

While natural habitats are, and should be, emphasized in this plan, man-made habitats such as old fields should also be recognized as important and incorporated into measures used to conserve species of concern when appropriate.

Wildlife Conservation on Public Lands

Public land management to benefit high priority species and habitats is an important complement to conservation efforts on private lands. While only approximately 8% of the state is in public ownership, these public lands serve critical ecological support functions. Many public agencies (e.g., Georgia DNR, U.S. Fish & Wildlife Service, National Park Service, U.S. Forest Service) have a specific mandate to conserve native wildlife species and their habitats. In addition, some public agencies whose primary mission is not wildlife conservation (e.g., U.S. Department of Defense) also manage ecologically significant lands containing high priority species and habitats. There is a

need for all public land managing agencies to conduct thorough biological inventories of their properties and address wildlife conservation needs in an ecological landscape context. As impacts to natural communities from various land uses continue to mount, collaborative interagency efforts to restore and maintain natural habitats and populations of rare or declining species will be essential to the overall goal of maintaining biological diversity in Georgia. Biological inventory and management efforts conducted in cooperation with private conservation and research organizations will be increasingly important as well.

Chattahoochee-Oconee National Forest

The Chattahoochee-Oconee National Forest is a unit of federal land in Georgia that contains two proclaimed National Forests. The Chattahoochee National Forest includes approximately 639,000 acres in the Blue Ridge, 65,000 acres in the Ridge & Valley, and 46,000 acres in the upper Piedmont of Georgia. The Oconee National Forest includes approximately 115,000 acres in the Piedmont of east-central Georgia. The Oconee is administered as a Ranger District rather than as a separate National Forest. Management of the Chattahoochee-Oconee National Forest is based on a cooperative relationship between the many users of the forest, the scientific community, and the United States Forest Service.

A Revised Forest Plan was recently completed for the Chattahoochee-Oconee National Forest as part of the long-range planning framework established by national policy under the Resource Planning Act and the National Forest Management Act of 1976. These acts require each National Forest to have forest plans that guide management activities. The Forest Plan provides direction to assure coordination of multiple uses (outdoor recreation, range, timber, wildlife and fish, and wilderness) and sustained yield of products and services. This includes, but is not limited to, providing habitat to maintain viable populations of plants, fish, and wildlife native to the planning area and supporting desirable levels of selected species (e.g., species with special habitat needs, locally rare species, species commonly trapped/hunted, or species of special interest). Georgia DNR provided significant input into the Forest Plan with regard to management of flora and fauna on the Chattahoochee-Oconee National Forest. As part of the revision effort, habitat needs for more than 1,500 species were considered at a regional scale and management direction was developed to ensure their continued viability. It was the largest, most detailed, and most analytically rigorous planning effort of its kind ever undertaken within the Southern Region of the National Forest system.

The Endangered Species Act (ESA) mandates that federal agencies ensure that any action “authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species” or result in the destruction of critical habitat. The U.S. Fish and Wildlife Service (USFWS) was a valuable partner in helping develop goals for federally listed species on the Chattahoochee-Oconee National Forest. Habitat and wildlife management objectives and standards were also provided, and these recommendations were incorporated into the final plan. The USFWS concurred with the Forest Service’s determination that effects in the Forest Plan Revision are “not likely to adversely affect” federally listed endangered or threatened species or their habitats.

Highest Priority Conservation Actions

Highest priority conservation actions (actions ranked “Very High” or “High”) that relate to wildlife conservation efforts on public lands are listed below. Information on lead organizations, partners, funding sources and other details for these and other recommended actions can be found in Appendix L.

- Implement integrated natural resource management programs on state lands, emphasizing restoration and management of natural communities and rare species. Revise and update management plans for WMAs, natural areas, and other state lands as needed to address specific restoration objectives.
- Survey state-owned lands (WMAs, natural areas, public fishing areas, state parks) for federal and state protected species and other species of concern, and incorporate conservation objectives for these species into management plans.
- Implement integrated resource management on federal lands, emphasizing restoration and maintenance of natural communities and rare species. Work with federal agencies and other conservation organizations to facilitate enhancement of ecosystem functions and address regional conservation needs.

Assessments of High Priority Habitats and Species

Assessments of the status of high priority species and habitats represent important components of any wildlife conservation strategy. Several high priority research and survey projects relating to species or habitats within a given ecoregion or physiographic province have been mentioned in Section IV of this document. In addition to these projects, there are several highly ranked projects that are statewide in scope or include several ecoregions. These include priorities identified in recovery plans for federally listed species as well as other identified research needs. The highest priority conservation actions identified by the technical teams, Steering Committee, and other stakeholders that pertain to assessments of high priority habitats and species are found below. For more information, refer to Appendix L.

Highest Priority Conservation Actions

- Conduct statewide assessments of aquatic communities to determine biotic integrity of streams. Expand biological survey efforts in high priority streams (e.g., Tennessee and Satilla basins).
- Conduct statewide assessments of rare natural communities and habitats that support species of conservation concern. Assess the status and distribution of rare natural communities using a revised natural community classification system.
- Conduct a statewide wetland mapping and assessment effort. Analyze wetland trends to determine the condition and vulnerability of wetlands in the state.
- Monitor land use changes in Georgia to assess potential impacts on high priority species and habitats. Develop projections of future land use trends and resulting impacts on ecological systems.

- Assess the status of high priority bryophytes and graminoids in Georgia. Conduct surveys for rare plants known historically from Georgia.
- Conduct aerial surveys for federally listed birds (bald eagle nesting surveys and wood stork nesting and roosting surveys).
- Monitor populations of gray and southeastern bats in caves, and conduct surveys of rare forest-roosting bats.
- Conduct mussel surveys of Broad River and prioritize other watersheds for mussel surveys (e.g., Flint, Satilla).

Conservation of High Priority Habitats and Species

Wildlife conservation efforts may be focused on protection or management of natural habitat, management of populations, or management of stressors to those populations and habitats. Several important wildlife conservation themes that span ecoregions or apply to the entire Georgia landscape are described below. Other priorities will be identified through periodic assessments of conservation needs based on the best available data.

Restoration and Management of Fire-Maintained Communities

Many of Georgia's rare or declining species depend on habitats that are maintained by fire. These habitats are declining in extent and condition due to fire suppression and/or lack of prescribed fires. Opportunities exist to improve our management of these fire-dependent communities. Among the impediments to wider application of prescribed fire programs are smoke management problems, restrictions on burning due to non-attainment of air quality standards in metropolitan areas, reluctance of landowners to use prescribed fire due to concerns about liability, lack of understanding of the role of fire in some natural environments, and a lack of technical expertise with regard to the application of prescribed fire in some sensitive habitats.

Several existing programs can provide assistance to landowners for prescribed burning; examples include Environmental Quality Incentives Program (EQIP), Wildlife Habitat Incentive Program (WHIP), and Landowner Incentive Program (LIP). In addition, a group known as the Interagency Burn Team (IBT) has recently been formed to facilitate application of prescribed fire in Georgia.

To address the need for restoration of fire-maintained communities, WRD should continue to work with other agencies to share expertise and develop new methods for implementing prescribed fire in various Georgia habitats, encourage fire ecology research by public and private research institutions, and work with the Environmental Protection Division and the Southwest Georgia Prescribed Fire Council to provide reasonable burn windows in metropolitan counties. Fire-dependent habitats on all public lands should be identified and addressed in management plans, and additional fire training and equipment should be provided to managers of state parks and other facilities. Finally, financial and technical assistance and educational outreach efforts are needed to encourage restoration of fire-maintained communities on private lands.

Interagency Burn Team (IBT)

Overseen by the U.S. Fish & Wildlife Service, the IBT is a public-private cooperative of highly trained personnel who work throughout the state to conduct prescribed burns on lands that need fire to benefit rare species. The IBT is staffed from various organizations including the Georgia Department of Natural Resources Wildlife Resources and Parks, Recreation and Historic Sites divisions, the U.S. Fish & Wildlife Service, the Georgia Forestry Commission, the Georgia Chapter of The Nature Conservancy, the Natural Resources Conservation Service, and the Atlanta Botanical Garden.

Private lands that harbor rare species and are in close proximity to conservation lands are the targets for IBT activities. Each agency nominates sites and provides planning and a qualified burn boss for specific prescribed burns.

Burn crews must be certified with the NWCG (National Wildfire Coordinating Group). Funding for the project, which covers staff time and firebreak construction, is provided through the USFWS. When weather conditions are right, the nominating agency calls in the IBT to assist in the burning. The nominator is also responsible for monitoring the effects of the fire and the benefits to rare species.

A number of high priority habitats have benefited from this cooperative effort to date, including calcareous prairies, montane longleaf pine-hardwood forest, granite outcrops, and longleaf pine-scrub oak woodlands.

Protection and Maintenance of Healthy Vegetated Stream Buffers

Establishment and maintenance of vegetated riparian buffers is one of the most important and cost-effective conservation measures for protection of water quality and aquatic ecosystem health. Many of Georgia's streams suffer from insufficient stream buffers and are thus at risk of water quality impairment resulting from land-disturbing activities, introduction of toxic chemicals or excess nutrients, and thermal impacts from lack of shading. Establishment of substantial vegetated buffers is highly recommended for all high priority streams. Breaches of these stream buffers should be minimized through careful placement of roads, bridges, utility corridors, and livestock crossings. Access to streams by all-terrain vehicles and livestock should be limited to maintain water quality.

Strategies to protect and maintain healthy stream buffers include working with state and county road departments to improve placement and design of road turnouts, developing standards for stream corridor protection on public lands, and providing information on high priority streams to commercial and non-profit mitigation bankers to encourage restoration and enhancement of vegetated buffers. Other strategies include providing financial incentives to private landowners to fence livestock out of streams, working with local governments and developers to ensure protection of stream buffers when

development plans are considered, and working with ATV manufacturers to develop and disseminate messages discouraging ATV use in and adjacent to streams.

Protection of Isolated Wetlands

Isolated wetlands comprise an important group of habitats for wildlife, including more than 45 Georgia species of conservation concern (Comer et al., 2005). Studies of the extent and condition of isolated wetlands indicate a consistent trend toward degradation and loss. A recent study of Carolina bays in Georgia indicated that the majority of the smaller bays showed evidence of hydrologic alterations or other forms of degradation (VandeGenachte and Cammack, 2002). Other examples of important isolated wetlands include solution pits on granite outcrops, shallow depressions in pine flatwoods, Grady ponds, limesink ponds, and sandhill ponds. Depression wetlands that have direct connections to groundwater may be significantly affected by excessive groundwater withdrawal to a point at which the hydroperiod is diminished or even eliminated. Other isolated wetlands have been impacted by introduction of predatory fish, excessive inputs of sediments or nutrients, ditching and draining, or conversion to agricultural uses.

It is more accurate to refer to these wetland systems as “geographically isolated” rather than hydrologically isolated, since research indicates that most of these systems are connected to streams or to other wetlands on a periodic basis, or are replenished by or discharge to underground aquifers (Comer et al., 2005). The level of protection for these wetlands under the federal Clean Water Act is currently being contested in the courts, as is the question of what constitutes a “significant nexus” or connection with jurisdictional waters of the U.S. Some provisions of the federal Food Security Act of 1985 provide financial disincentives for destruction of isolated wetlands. However, legal uncertainty over regulatory authority and agency jurisdiction, combined with the relative ease with which these wetlands can be degraded or obliterated provides a compelling case for increased emphasis on protection, restoration, and maintenance of a large number of each size class and habitat type. Georgia DNR and other organizations should identify and protect the most significant examples of these wetland habitats through fee-simple acquisition or conservation easements. In addition, programs providing financial and other incentives should be directed to private landowners to encourage the protection, restoration, and management of these important wetlands. Finally, permits for groundwater and surface water withdrawals should be administered with careful consideration of resulting impacts to these and other wetlands.

Protection of Headwater Streams

Headwater streams are found in the upper reaches of watersheds and may have flowing water for only a portion of the year. Headwater streams account for the majority of stream miles in a given watershed. Like isolated wetlands, these habitats are important for a wide variety of wildlife species, including several rare species of concern. These headwater systems are also important for maintenance of habitat quality in the higher-order perennial streams which they feed (Meyer et al 2003). Intermittent/ephemeral streams and associated seepage wetlands are often overlooked when streams and

wetlands are mapped. In addition, they have received less research emphasis than perennial streams. In areas where development pressures are high or agricultural uses are prevalent, many of these habitats may be adversely affected by land disturbing activities.

Protection of headwater streams and associated wetlands is critical for protection of wildlife diversity and maintenance of water quality. Other states have found it useful to map stream networks with more precision than is provided by standard USGS topographic maps, and have found that a large percentage of small streams were either absent on these topographic maps, or were misclassified (e.g., streams shown as intermittent were actually perennial). Greater emphasis should be placed on accurate mapping and delineation of headwater streams (Ohio Environmental Protection Agency, 2002). In addition, more research attention should be focused on these relatively unknown habitats. The effects of groundwater and surface water withdrawals on headwater streams and associated wetlands should be considered, and the overall contribution of these systems to biological diversity in a given watershed should be investigated in greater detail.

Control of Exotic Species Populations

There are an estimated 50,000 nonnative species in the U.S., and the number is steadily increasing. Many of these nonnative species represent serious threats to agriculture, horticulture or forestry. Other nonnative species are more likely to impact natural communities and individual populations of native wildlife species. The long-term effects of nonnative species on native wildlife species are generally considered to be second only to direct habitat destruction or conversion. Approximately 42% of the species listed as Endangered or Threatened under the federal Endangered Species Act are significantly impacted by invasive exotic species. On a national basis, the economic losses and environmental damage caused by exotic species total approximately \$120 billion per year (Pimentel et al., 2004). A recent survey of managers of 430 national wildlife refuges indicated that 80% of the refuges recognized problems with invasive exotic organisms. Refuge managers reported more than 790 invasive organisms, including 507 nonnative plants, 208 nonnative animals, and 76 plant and animal diseases (Simonson et al., 2004).

Invasive exotic species constitute a significant threat to Georgia's biological diversity. Many native species are declining due to increasing competition or habitat degradation from invasive exotic species. Feral hogs, red shiners, and flathead catfish are examples of animals that can cause serious impacts to natural communities and native species. A great number of exotic plants such as Nepal browntop, hydrilla, Chinese tallow tree, hydrilla water hyacinth, autumn olive, coastal bermudagrass, and Chinese privet also pose serious threats to Georgia's natural communities. An exotic forest pest in North Georgia, the hemlock wooly adelgid, is causing decline of hemlock populations and as a result, threatening adjacent aquatic systems with increases in water temperature. Problems with invasive exotic species have been documented on a number of public lands in Georgia, and control measures have been instituted on a modest scale.

In recent years, several national organizations have begun to focus on the need to monitor populations and impacts of exotic species, and some notable efforts have been instituted regionally and in Georgia (e.g., Georgia Exotic Pest Plant Council, Aquatic Nuisance Species Task Force). However, there is currently little monitoring of exotic species populations or effectiveness of control measures. Given the serious economic and environmental impacts of invasive exotic species, more emphasis should be placed on assessment, control, and monitoring programs statewide.

Protection of Caves and Other Karst Environments

Caves, limesinks, sagponds, and springs represent some of the most sensitive natural habitats in Georgia. These karst environments harbor many of Georgia's rarest and most imperiled species, and are susceptible to impacts from a wide variety of human activities, from residential and commercial development to road and utility construction, excessive groundwater withdrawal, recreational activities, and altered water quality. Protection of caves and other karst environments is essential for maintenance of Georgia's biological diversity. Georgia's Cave Protection Act of 1977 (O.C.G.A. 12-4-140) provides for protection of caves, sinkholes, and speleothems (cave formations), prohibits the storage of hazardous materials and dumping of litter, garbage, or other materials in caves, and prohibits the harming, killing or removal of wildlife found within caves except by authorized personnel. It also provides protection against trespass and vandalism, and exempts landowners from liability for injuries sustained by individuals involved in recreational or scientific uses of caves.

There are more than 400 documented caves in Georgia, and the majority of these are located on private land. Established caving groups and experienced cave researchers respect the sensitivity of these habitats as well as the rights of property owners. However, some caves receive significant impacts from careless or unethical individuals. In addition, many of Georgia's caves are threatened by off-site land uses that result in inputs of sediments, excess nutrients, or toxins. Only a small percentage of Georgia's caves have received biological surveys. Additional survey efforts are needed to document the diversity of cave organisms in Georgia and to establish conservation priorities for individual caves. Abandoned mines and tunnels can also provide habitat for cave fauna and should be evaluated as well (Tuttle and Taylor, 1994).

Restoration or Reintroduction of Wildlife Populations

Based on the results of assessments by the CWCS technical teams, there are 41 high priority animals and 61 high priority plants for which the recommended conservation emphasis is restoration or reintroduction of populations. This is an important but often overlooked aspect of wildlife conservation. In some cases, a species has been nearly or completely extirpated from a region or state, but suitable habitat exists for reintroduction of the species. In other cases, the extirpation was accompanied by a loss of suitable habitat, so habitat restoration is the necessary first step.

Examples of species for which restoration/reintroduction is a primary conservation emphasis include Florida torreya, bog turtle, smooth purple coneflower, shoals spiderlily, spotfin chub, robust redhorse, lake sturgeon, Altamaha spiny mussel, and Tennessee heelsplitter. These species require special emphasis on habitat protection and maintenance, propagation of individuals, and reintroduction of these individuals into protected habitat. A special case involves extirpated populations of freshwater mussels. For these species, attention must be paid not only to restoration of suitable habitat, but also to management of fish species that serve as hosts to these mussels. In some cases, the host fish(es) may have been eliminated from the watershed, and must be reestablished in order to provide an opportunity for restoration of the mussel populations.

Highest Priority Conservation Actions

Specific conservation actions that relate to conservation of high priority habitats and species statewide or over several ecoregions include the following. Information on lead organizations, partners, funding sources and other details for these and other recommended conservation actions can be found in Appendix L.

- Draft a comprehensive wetland protection strategy for Georgia. Identify conservation needs for various types of wetlands and highest priority sites or examples. Determine priorities for protection of wetlands based on condition, species composition, and ecological and economic benefits.
- Control populations of feral hogs to conserve high priority habitats and species. Increase hunting pressure on public and private lands and implement trapping and shooting programs in especially sensitive areas (e.g., barrier island beaches).
- Develop a comprehensive action plan to control exotic species on public and private lands. Increase public awareness of problems caused by invasive exotic species; reduce use of exotic plant species and increase use of native plants in erosion control and landscaping.
- Encourage use of prescribed fire as a habitat management tool on private lands. Provide information and technical assistance to landowners to encourage appropriate use of prescribed fire as a management tool to enhance and maintain wildlife habitats.
- Continue investigations of potential host fishes for imperiled freshwater mussels, including the Altamaha spiny mussel and Altamaha arc mussel
- Maintain a network of facilities (e.g., Atlanta Botanical Gardens, State Botanical Gardens, Coastal Plain Botanical Gardens) for propagation of rare plants and safeguarding of genetic resources.
- Continue efforts to restore and enhance populations of red-cockaded woodpeckers through implementation of the Conservation Plan for demographically isolated RCW populations.
- Implement restoration projects for diadromous fishes (e.g., shortnose sturgeon, Atlantic sturgeon, Alabama shad, American eel, striped bass)

Lake Sturgeon Reintroduction Effort

There is evidence that the lake sturgeon once inhabited the Etowah, Oostanaula, and Coosa rivers within northwestern Georgia and northeastern Alabama. Historical photographs and interviews with anglers indicate that the lake sturgeon existed in the Coosa River system through the late 1960's. Pollution, over-harvest, and construction of the Weiss dam are thought to have contributed to extirpation of the species in Georgia.

The lake sturgeon reintroduction effort began in December 2002 and is slated to continue at least 20 years. The purpose is twofold: to establish a self-reproducing population capable of supporting a sport fishery, and to contribute to the overall conservation of the lake sturgeon in North America. Georgia DNR receives 40,000 eggs per year through a cooperative agreement with Wisconsin DNR. The eggs are hatched and the fingerlings grown out to four to six inches at the Summerville Fish Hatchery near Rome, Georgia. To date, 32,181 sturgeons have been released into the Coosa River system.

In the summer of 2003, anglers observed six lake sturgeons feeding along the concrete walls of Mayo's Lock and Dam in Rome. Additional sturgeons have since been observed or caught and released by anglers at various locations. In 2004, researchers from the University of Georgia's Warnell School of Forest Resources began tracking the sturgeon using implanted radio transmitters to study seasonal behavior and identify critical habitat for growth and survival. The fish are utilizing the lower Coosa, Etowah, and Oostanaula rivers as well as Lake Weiss in Alabama. Data from netting surveys conducted by state and university biologists indicates good survival and growth of the sturgeons, with individuals up to 30 inches being caught, measured, and released. This reintroduction effort is combined with an extensive public outreach effort aimed at improving public awareness of the need for lake sturgeon conservation (see following box).

Environmental Education and Public Outreach

The ability to manage and protect Georgia's wildlife depends upon an informed and engaged public. Many Georgians are unaware of the ecological and biological diversity in this state, the problems facing wildlife species and their habitats, and opportunities for involvement in programs or activities that will help protect this diversity. A concerted effort by many different organizations to provide accurate, relevant, and consistent conservation messages to diverse audiences is needed. Several different agencies and organizations have developed messages and materials that can contribute to a better public understanding of Georgia's wildlife diversity. However, there is a need to make this information available to a wider range of audiences. In addition, there is a need to tailor the messages and to make them more relevant to local or regional conditions.

The Environmental Education Technical Team report is found in Appendix E. In addition to the goals and objectives of the WRD Five-Year Education Plan, the Environmental Education Team objectives include plans to measure environmental literacy in Georgia, publish findings of the CWCS technical teams, promote targeted

educational messages related to CWCS objectives, develop easy-to-use educational materials, establish a network of regional educators and community groups, and increase support for coordination of environmental education in Georgia. Other specific educational objectives were discussed at the regional stakeholder meetings.

The Georgia Department of Natural Resources recognizes that education and outreach are critical to increasing awareness about conservation issues and gaining public support and involvement to protect the state's natural resources for future generations. The agency has developed two strategic goals, sustaining our natural and cultural resources and building a conservation ethic, and is working with internal and external stakeholders to implement them.

In April 2005, DNR Commissioner Noel Holcomb assembled a group of educational organizations from across the state committed to conservation education, including Fernbank Museum of Natural History, Zoo Atlanta, Flint River Aquarium, Stone Mountain Authority, Environmental Education Alliance of Georgia, Georgia Public Broadcasting, and the University of Georgia College of Environment and Design. The group agreed that a united effort to educate citizens on natural resource issues was long overdue and requested that the Department of Natural Resources identify issues whereby these groups could work cooperatively to focus their efforts through educational programming, facility development and marketing over the next five years. Over the next few months, working groups will develop objectives and tasks for those organizations that want to participate in this cooperative education and outreach effort.

Highest Priority Conservation Actions

Highest priority conservation actions (actions ranked "Very High" or "High") that relate to improvement of environmental education and outreach include the following. Information on lead organizations, partners, funding sources and other details for these and other recommended actions can be found in Appendix L.

- Assess the current level of environmental literacy among the general public in Georgia. Partner with a local university or independent research firm to develop survey questions that can be applied to assess the knowledge of Georgians on key environmental issues.
- Create targeted messages related to the conservation of Georgia's natural resources. Applying the findings of the literacy study, develop and test educational messages focused on far-reaching concepts related to conservation of Georgia's natural resources.
- Develop a coordinated statewide outreach and public relations campaign to increase public support for wildlife conservation.
- Develop technical educational materials such as the Breeding Bird Atlas, updated booklets on protected species, and a revised natural community classification system for Georgia that will address educational needs for biology teachers, naturalists, land managers, and conservation groups.

- Develop “hands-on” educational materials to facilitate delivery of conservation messages to the public.
- Establish a network of regional educators and community contacts to provide workshops and programs to introduce key conservation messages to target audiences.
- Publish CWCS technical team findings. Compile, condense, and summarize technical team findings in a format that includes key educational messages that are relevant to the general public.

Lake Sturgeon Reintroduction – Public Outreach Efforts

Public outreach efforts for the lake sturgeon reintroduction effort include the following:

- Informational signs in English and Spanish at various locations along the Etowah, Oostanaula, Coosa, and Coosawattee Rivers in Georgia, and Lake Weiss in Alabama
- Sturgeon ID cards and sighting report forms distributed to anglers by WRD Law Enforcement and Fisheries Management personnel and local bait shops
- Press releases distributed to north Georgia media issued for each stocking event
- Fact sheets and PowerPoint presentations on lake sturgeon distributed statewide from DNR educational facilities for use by teachers
- Presentations by WRD staff to civic, school, and sportsmen’s groups.
- Use of live and fiberglass mounted sturgeon displays at various outdoor functions.
- Articles in regional and national publications; presentations on commercial radio stations and regional cable TV.
- Involvement with third, fourth, and fifth graders from City of Calhoun and Armuchee Elementary schools in stocking efforts. This includes meeting with classes before stocking, providing one-page information sheets that can be colored, providing references for teachers, providing photo CDs to classes following stocking, and displaying sturgeons at the regional WRD environmental education center near Rome.



Increasing Capacity for Wildlife Conservation

The ability of any agency or organization to meet its objectives depends to a large extent on the availability of necessary resources (staff, funding, equipment, etc.). The various conservation objectives outlined in this document will require financial, technical and other resources well in excess of those available to the Georgia Department of Natural Resources and its conservation partners in 2005. For this reason, an assessment of actions related to increasing capacity for wildlife conservation in Georgia is warranted.

By participating in multi-state interagency conservation initiatives, Georgia DNR can help generate additional funding for high priority wildlife conservation projects. An example is the Southeastern Aquatic Resources Partnership (SARP), a 13-state regional aquatic conservation partnership involving state and federal agencies as well as nongovernmental organizations. SARP, which focuses on protection, conservation, and restoration of aquatic resources, is considered a regional component of the National Fish Habitat Initiative (NFHI), which began in 2004 under the auspices of the International Association of Fish and Wildlife Agencies.

Regional conservation partnerships such as SARP are important for coordination of conservation efforts and development of greater capacity to address regional conservation needs. Other important approaches include development of in-state partnerships to share resources and expertise, reallocation of existing staff to address areas of greatest conservation need, and exploration and development of new funding sources.

Members of the technical teams and other stakeholders provided recommendations regarding improvements in staffing, funding, database development and use, and other issues. In addition, members of the Steering Committee developed a list of available habitat protection tools (Table 11) as well as a matrix of funding sources for habitat protection (Table 12). Listed below are the highest rated action items relating to development or augmentation of resources needed for conservation of Georgia's wildlife. See Appendix L for more details.

Highest Priority Conservation Actions

- Establish a consistent source of funding for land protection to support wildlife conservation.
- Improve capacity to work with corporate landowners to protect wildlife habitat; provide enhanced technical support through additional staff or contractors.
- Increase availability and use of federal funds for land acquisition (fee-simple and conservation easements) and land management.
- Increase regional focus for nongame wildlife conservation efforts. Increase and reallocate staff to take advantage of conservation opportunities in each ecoregion and major river basin and facilitate delivery of conservation programs.
- Restore state funding to support WRD's nongame wildlife conservation efforts.

- Strengthen the network of support for wildlife conservation. Develop a stronger coalition of environmental organizations to communicate CWCS objectives and work for environmental improvements.
- Improve biodiversity databases and increase data sharing with conservation partners. Establish formal data-sharing agreements with conservation partners.

Reducing Impacts from Development and Other Activities

Continued growth of Georgia's human population and associated loss or fragmentation of natural habitats will undoubtedly result in more impacts to native species. Of particular concern are habitat specialist species adapted to rare or sensitive habitats (e.g., cave-dwelling organisms or granite outcrop plants). Every effort should be made to minimize impacts of development, recreation, and other activities on these organisms and their habitats. The highest rated conservation actions related to reduction or avoidance of impacts from development and other activities on high priority species and habitats are found below. See Appendix L. for more information.

Highest Priority Conservation Actions

- Decrease the impact of poorly designed road crossings on fish passage. Work with FEMA, Georgia DOT, and county road departments to improve fish passage with bottomless culverts or free-span bridges.
- Expand use of WRD biodiversity data for environmental review, public outreach, permitting, and development of site management plans to minimize impacts on rare species and sensitive habitats.
- Reduce impacts of unpaved roads, parking lots, boat ramps, and camping areas on aquatic habitats.
- Work with Georgia DOT and federal agencies to minimize impacts from highway construction and facilitate protection and mitigation of high priority habitats.
- Facilitate training for and compliance with Best Management Practices for erosion and sedimentation control, stormwater runoff, and stream buffer protection (see Table 13).

Wildlife Laws and Regulations

State and federal laws pertaining to wildlife conservation are described in Appendix G. These laws provide mandates for state and/or federal agencies to protect natural resources for the benefit of society. These include regulations dealing with the conservation of rare species, natural areas, and specific natural habitats (e.g., caves, salt marshes, coastal dunes), regulation of take of game and nongame wildlife (e.g., hunting and fishing regulations, collecting permits), review and permitting of mining, dam construction, groundwater withdrawal, road construction, utility construction, and similar projects; adjustments to land valuation and taxation based on conservation easements; and laws relating to development of local or regional land use plans and greenspace protection plans. During the course of this planning effort assessments of existing laws, regulations, and policies were made in order to assess the effectiveness of regulatory efforts in

conserving Georgia's wildlife diversity. Some species of wildlife are impacted by direct take or commercial harvest, both of which are regulated by state or federal law.

The intent of this assessment was to examine existing laws and regulations and to determine where opportunities to protect biological diversity could be improved by increasing public awareness of existing laws, promoting interagency cooperation in law enforcement, ensuring appropriate consideration of wildlife impacts in environmental review procedures, and utilizing information on rare species and natural communities to inform local or regional land use plans and greenspace protection plans. Several areas of recommended improvement were identified during this assessment. The highest priority items are listed below.

Highest Priority Conservation Actions

Highest priority conservation actions pertaining to the regulatory aspects of wildlife conservation are listed below. Information on lead organizations, partners, funding sources and other details for these and other recommended actions can be found in Appendix L.

- Update the state-protected species list and work with partners to improve conservation and management of these species. Conduct a review of Georgia's protected species list at least once every five years and engage key partners to improve management programs for these species.
- Enhance DNR Law Enforcement training and staffing to address nongame wildlife law enforcement needs. Provide additional training on laws and regulations established to protect nongame wildlife and additional staff resources to handle enforcement of nongame and protected species regulations.
- Improve coordination of environmental review procedures within DNR to ensure that potential impacts to rare species and sensitive natural habitats are adequately addressed for all major projects.

Monitoring and Adaptive Management

One of the goals of this effort is development of plans to monitor high priority species and habitats as well as conservation actions for those elements of biodiversity. Monitoring programs are essential in order to assess the success of conservation programs and to facilitate adjustments in these programs to increase their efficacy; this ability to change management options based on an objective assessment of past efforts is known as adaptive management. The types of data needed for this conservation objective pertain to the quantity, distribution, and condition of habitats and populations.

Given the fact that monitoring is both time-consuming and relatively expensive in terms of labor costs, there is a need to place realistic limits on the number of species and habitats monitored. In addition, opportunities to use volunteer and "citizen scientist" groups should be explored. High priority species for monitoring programs will be those that are readily identifiable in discernible populations large enough to be measured or

estimated consistently over time. For habitats, the situation is similar but more complex and problematic. Habitats do not conform to a standard taxonomy, and there are relatively few standardized methods for measuring habitat quality. The creation of comprehensive habitat monitoring programs requires participation by a variety of partners, both public and private (Illahee, 2005).

Database and website searches and a tally or registry of existing conservation actions are needed to establish baselines for monitoring. Many of the ongoing efforts by WRD and other major conservation partners have been documented. However, there are other efforts by local groups, partners in other state agencies, and private landowner groups that should be documented and acknowledged.

The approach taken in this planning effort has been to incorporate monitoring activities as components of each proposed conservation action (see Appendix L). Focal species and habitats are indicated, lead and partner organizations are identified, and funding sources are listed. In addition, the types of data that will be collected and the relevant performance indicators have been described or outlined in this table. More work is needed in order to develop detailed monitoring programs for each conservation action. However, it is apparent from the diverse array of high priority conservation actions identified in this document that monitoring will take place at a variety of geographic and ecological levels and will involve partnerships with a number of organizations.

In addition, the following specific strategies will be employed as appropriate to improve the monitoring aspects of this conservation strategy.

- Create a state-level matrix of conservation actions undertaken by all major conservation partners and use this as a benchmark to document progress toward conservation goals identified in this strategy.
- Include monitoring components and standards for conservation projects proposed for funding through the State Wildlife Grants program or other funding sources, and ensure that these include objective and measurable performance indicators.
- Expand the historic vegetation mapping pilot project to develop maps showing historic vegetation types for a variety of public lands in each ecoregion, and use these maps to inform long-term management plans for these sites.
- Establish easy to use vegetation monitoring programs to document and evaluate the effectiveness of habitat restoration projects on public lands.
- Develop tracking databases and standard protocols for monitoring and assessing populations of invasive exotic species.
- Use local Adopt-A-Stream groups to monitor biotic and abiotic conditions in high priority streams and watersheds, and make this information available to all conservation partners.
- Expand the Breeding Bird Survey of Georgia to approximately 100 routes in order to obtain a more complete picture of the status of all land birds in Georgia.
- Continue efforts to monitor land use changes statewide and in each ecoregion using Landsat Thematic Mapper imagery and ancillary data, and use this

- information together with projected population and development trends to assess current and future impacts on high priority habitats and species.
- Revise the natural community classification system for Georgia to make it more compatible with the NatureServe ecological systems and Georgia GAP land cover types, and use this as the standard for habitat mapping statewide.
 - Utilize groups of trained volunteers (e.g., “Botanical Guardians”) to monitor populations of rare plants on conservation lands.
 - Continue efforts by the WRD Stream Survey Team to monitor streams statewide using Index of Biotic Integrity protocols.
 - Work with other agencies and organizations (e.g., National Park Service, U.S. Geological Survey, U.S. Environmental Protection Agency, U.S. Fish & Wildlife Service, The Nature Conservancy) to develop and refine monitoring protocols for species, habitats, and environmental variables.
 - Utilize data from the Forest Inventory and Analysis program to assess trends in forest distribution and condition in Georgia.

Forest Inventory and Analysis Program

The Forest Inventory and Analysis (FIA) program is administered by the USDA Forest Service and coordinated by five regional USDA research stations. The Southern Research Station is responsible for maintaining inventories in 13 states, Puerto Rico, and the Virgin Islands. The FIA program provides the most comprehensive assessment of status and trends in forested lands in the United States. The Forest Service has conducted systematic inventories of U.S. forests since 1930. These inventories are based on field assessments and analysis of other data sources such as aerial photography. Past inventory cycles have ranged from six to eight years in the South and 11 to 18 years in the rest of the country. Within the last decade, the FIA program began a transition to an annual assessment of forested lands. The emergence of new technological improvements has enabled the FIA program to make a commitment to annual assessments of forestlands in every state.

To meet its mandated objectives, the FIA program relies on assistance from state forestry agencies. In Georgia, this assistance is provided by the Georgia Forestry Commission (GFC). Data sources used in the FIA program include permanent field plots, aerial photography, and satellite imagery. In the future, more emphasis will be placed on use of remotely sensed imagery to provide rapid and cost-effective assessments of forest conditions and trends. The information generated from FIA efforts will be made available for each state as well as for customizable areas of concern (e.g., counties, sub-state regions, and watersheds). The FIA program will be of increasing significance in the South, where land use changes and resultant loss of forestlands are most pronounced. The new annual inventory system will provide information needed to monitor the spatial dynamics of forested lands in Georgia and other states and will help address questions about the sustainability of forestry in the South.

Public-Private Partnerships for Land Conservation

More than 90% of the land base of Georgia is in private ownership. Several programs that represent specific efforts to enlist and engage private landowners in wildlife conservation have been mentioned above. Like other wildlife agencies, WRD depends on support from private landowners to accomplish its mandated objectives. Georgia's wildlife cannot be conserved solely through the actions of public agencies, nor can fee simple land acquisition be the "silver bullet" in land conservation.

The Georgia Land Conservation Partnership Plan (Appendix I) outlines several areas in which public-private partnerships can be developed to achieve land conservation goals. This report focused on land conservation goals and potential mechanisms for protecting natural, cultural, recreational, and scenic resources. Among its recommendations were: the establishment of a revolving fund for protection of lands through fee simple acquisition or conservation easements; the creation of a public authority to purchase lands and resell them with easements; and a system of partnerships involving state agencies, private conservation organizations, local governments, and private landowners. This report also addressed the need for tax relief to protect rural properties from the impacts of residential and commercial sprawl and mentioned other relatively new approaches such as transferable development rights and carbon sequestration credits.

Other opportunities for public-private partnerships in conservation not addressed in the Georgia Land Conservation Partnership report include the use of general obligation bonds to fund certain types of private ventures to protect "working landscapes" (i.e., forestry or agricultural lands) for specific wildlife conservation goals (Dechter, 2003), state leases of private lands for public recreational access, and application of development fees to rural land protection through application of conservation easements or fee simple acquisition. In the field of rare species recovery, Safe Harbor Agreements and Habitat Conservation Plans provide flexibility as well as regulatory relief for private landowners cooperating with public wildlife agencies.

A new area that may provide opportunities for land conservation is the application of federal funds to protect lands adjacent to military bases from development using conservation easements; this can serve a dual purpose of maintaining base operational viability and protecting important wildlife habitat. State wildlife agencies in Georgia, North Carolina, South Carolina, and Florida are currently working with U.S. Department of Defense installations to identify potential areas of common interest in land acquisition and uses. Similar programs may be available for lands adjacent to national parks and other public properties.

The first piece of legislation to be approved by the 2005 session of Georgia General Assembly was the Georgia Land Conservation Act and on April 14, 2005, Governor Perdue signed into law this important piece of legislation. The bill enjoyed overwhelming public and legislative support and was generally lauded throughout the state. The intent of the Act is to provide funding options and a flexible administrative

framework to conserve land resources, recognize the values of the State's natural and cultural resources, and promote land conservation partnerships.

Maintaining Georgia's Forest Lands

The success of any comprehensive wildlife conservation strategy will depend on the existence of healthy, well-managed forests. Presently, Georgia is blessed with nearly 24 million acres of forestland, 75% of which is owned by thousands of non-industrial private landowners. These landowners manage their forests for a variety of objectives, including timber production, recreation, wildlife habitat, aesthetics, or quite often for a combination of these.

Many factors will determine whether Georgia will continue to have an adequate, sustainable forested environment to support a diverse wildlife population. Landowners and state policy-makers, those who are in a position to protect the state's forested land from conversion to non-forest uses, must have a long-term view when planning for land management and creating statutory and regulatory policy. Today, there are a number of disturbing trends which over time threaten to reduce the state's forestland and thus diminish the number, range and quality of wildlife habitats. Among these trends are the need for new markets for wood and fiber grown on private forestland, corporate divestiture of timber property, global competition, federal estate tax laws, urban and suburban sprawl and ad-valorem tax policy that taxes forest land on its 'highest and best' use rather than its current use. The degree to which these trends are addressed will determine whether many landowners and tree farm families will keep their land in trees, sell them, or convert them to non-forest uses such as commercial developments.

While some of these factors are beyond the scope of the state's authority, others are not. For example, the state has the power to alter the property tax system in a way that encourages landowners to grow trees on their property. In fact, a key finding of the Governor's Advisory Council for the Georgia Land Conservation Partnership, highlighted in its August 2004 report to the Governor, is that "Existing ad valorem tax policy is a disincentive for maintaining and conserving farms and forestlands. The State should review and consider amending funding mechanisms for local governments and school boards that would permit consideration of the current use method of ad valorem taxation".

The Wildlife Resources Division of the Georgia Department of Natural Resources views this new state land conservation program as an important and timely component of the Comprehensive Wildlife Conservation Strategy that will aid significantly in its implementation. This Act directs some \$100 million for land conservation efforts in the state of Georgia and makes available \$45 million in state and private funding that can and will be used to match and leverage various federal wildlife conservation grants consistent with the strategies and priorities included in this document.

The changes that are occurring in the Georgia landscape as a result of population growth and increasing development pressures present daunting challenges to those involved in wildlife conservation. The trend of increasing fragmentation and degradation of natural habitats is likely to continue in the coming decades, driven by local, national, and global

economic and demographic factors. Many scientists believe that the next fifty years will be a critical period in the struggle to protect our remaining biological resources.

The following elements are critical for conservation of Georgia's natural heritage: (1) increased emphasis on field research focused on the identification and assessment of species, biotic communities, and ecosystems; (2) greater commitment of resources to identify and protect those habitats that contribute most significantly to biodiversity; (3) further development and funding of conservation programs that emphasize public-private partnerships for broad-scale conservation of "working landscapes"; (4) greater emphasis on land use planning to minimize impacts of future developments on natural habitats; and (5) increased collaboration between researchers and educators to heighten public awareness of the magnitude and significance of biodiversity decline in the state. The Department of Natural Resources will continue to work with a wide array of public agencies, private conservation organizations, research institutions, sportsmen's groups, educators, local governments, and landowners in the coming years to address these critical elements of wildlife conservation.

Table 11. Habitat Protection Tools

Goal	Conservation Action	Type	Funding Source(s)	Lead Organization(s)	Partners
Protect High Priority Habitats	Fee simple acquisition- full value	Acquisition	* See Funding Matrix	Land Conservation Council (GEFA & DNR), local gov'ts, TCF, TNC, TPL	GWF, TGC, local land trusts, ACCG, GMA
Protect High Priority Habitats	Fee simple acquisition - bargain sale	Acquisition	*See Funding Matrix	Land Conservation Council (GEFA & DNR), local gov'ts, TCF, TNC, TPL	GWF, TGC, local land trusts, ACCG, GMA
Protect High Priority Habitats	Fee simple acquisition – donation	Acquisition	N/A	Land Conservation Council (GEFA & DNR), local gov'ts, TCF, TNC, TPL	GWF, TGC, local land trusts, ACCG, GMA
Protect High Priority Habitats	Acquire/attach easement/sell (loan fund)	Acquisition, Stewardship	*See Funding Matrix	Land Conservation Council (GEFA & DNR), local gov'ts, TCF, TNC, TPL	GWF, TGC, local land trusts, ACCG, GMA
Protect High Priority Habitats	Conservation easements – donated	Acquisition, Stewardship	*See Funding Matrix (Need funds for administration and monitoring)	Land Conservation Council (GEFA & DNR), local gov'ts, TCF, TNC, TPL, local land trusts	TCF, TNC, TPL, GWF, TGC, local land trusts
Protect High Priority Habitats	Conservation easements - purchased	Acquisition, Stewardship	*See Funding Matrix	Land Conservation Council (GEFA & DNR), local gov'ts, TCF, TNC, TPL, local land trusts, Ga. Agricultural Land Trust	GWF, TGC, AFT
Protect High Priority Habitats	Leasing land for management, public recreation	Financial Incentive	*See Funding Matrix	DNR, private landowners	TCF, TNC, TPL, GWF, TGC, local land trusts
Protect High Priority Habitats	Conservation Use Valuation (tax incentive); revise rules for acceptance	Financial Incentive	N/A	GFC, Ga. Dept. of Agriculture	Ga. Dept. of Revenue
Protect High Priority Habitats	Carbon sequestration	Financial Incentive	*See Funding Matrix	DNR, GFC, Georgia Power	Private landowners, developers
Protect High Priority Habitats	Development of Best Management Practices (See Appendix L)	Technical Assistance	GFC, SSWCC	GSWCC, DNR, GFC, Ga. Dept. of Agriculture	Private landowners, developers, local governments
Protect High Priority Habitats	Outreach and technical assistance to promote protection tools	Technical Assistance	State and federal funds	DNR, GFC, NRCS	Private landowners, developers, local governments
Protect High Priority Habitats	Local land use - Develop comprehensive plans to include land conservation	Planning	Local governments	DCA	TGC, UGA, ACCG, GMA
Protect High Priority Habitats	Transferable Development Rights (TDRs)	Planning	*See Funding Matrix	Land Conservation Council, local gov'ts	TGC, UGA, ACCG, GMA
Protect High Priority Habitats	Conservation subdivisions	Planning	*See Funding Matrix when conservation lands or easements are acquired	DCA, DNR	TGC, UGA, ACCG, GMA
Protect High Priority Habitats	Agricultural districts	Planning	N/A	DCA, DNR, Ga. Dept. of Agriculture	TGC, UGA, ACCG, GMA
Protect High Priority Habitats	Buffer ordinances	Regulation	N/A	DCA, DNR	TGC, UGA, ACCG, GMA
Protect High Priority Habitats	Tree ordinances	Regulation	N/A	DCA, DNR	TGC, UGA, ACCG, GMA
Protect High Priority Habitats	Wetland mitigation	Regulation	*See Funding Matrix	DNR, GDOT	Army COE, TCF, TNC, TPL

Table 12. Habitat Protection Funding Matrix

Habitat Protection Funding Program	Average Project Amount	Match Requirement	Description/Focal habitats/Project type/Keywords	Funding Source
Georgia Land Conservation Act	TBD	TBD	TBD	State of GA
Department of Defense Legacy Management Program	Variable	None	DOD lands: land stewardship, management, monitoring, Range Readiness and sustainment, integrated natural resource management, regional ecosystem initiatives, national and international initiatives, invasive species, monitoring	DOD
Department. of Defense Encroachment and Buffering Funds	Variable	None	Funds the acquisition of real estate interests that permanently prevents land uses detrimental to the continued viability of military bases	DOD
U.S. Army Corps of Engineers Environmental Restoration Discretionary Funds	\$65 million nationally in FY 2004	25-35% match	The Water Resources and Development Act (WRDA) authorizes the Corps to study and implement large-scale environmental restoration projects with Congressional approval. Sections include Corps funding for the: restoration of ecosystems degraded by prior Corps projects; restoration of aquatic ecosystems to improve environmental quality; and the protection, restoration, and creation of aquatic and related habitats related to dredge activity.	USACE
Five-Star Restoration Program	\$5-20K	2:1	Floodplains and riparian zones, forests, outreach, partnerships, restoration, wetlands, wildlife	EPA
National Wetland Program Development Grant		25%	Coastal waters, data analysis, education, enforcement/compliance, floodplains and riparian zones, forests, monitoring, nonpoint source control, outreach, planning, restoration, wetlands, wildlife	EPA
Nonpoint Source Implementation Grants (319 Program)		50%	Drinking/source water, nonpoint source control, restoration	EPA
Sustainable Development Challenge Grants	\$28-200K	20%	Drinking/source water, economic development, education, forests, partnerships, planning, pollution prevention, restoration, wetlands, wildlife	EPA
Water Quality Cooperative Agreements		None	Best management practices, education, mining, monitoring, nonpoint source control, planning, point source control, pollution prevention, stormwater management, wastewater	EPA
Watershed Assistance Grant	Max \$30K	None, but preferred	Drinking/source water, education, monitoring, outreach, partnerships, planning, pollution prevention, restoration	EPA
Joint Fire Science Program	\$250,000	None, but preferred	Wildland Fire, fuels fire behavior, prescribed burning	JFSP
Migratory Bird Conservation	\$20K - \$70K	50%	Acquisition, restoration, and improved management of habitats, Education, research, and monitoring, partnerships	NFWF
Native Plant Conservation	\$5k - \$40K	50%	On the ground restoration, local community involvement, volunteers, pollinator conservation	NFWF
NOAA Partnership	\$10K - \$75K	50%	Restoration, partnerships, on the ground, watershed scale,	NFWF
Wetlands and Private Lands Initiative		min. 2:1	Education projects that conserve the nation's wetland resources, in particular habitat for wetland-dependant fish and wildlife.	NFWF
Pulling Together Initiative	\$10-100K, avg. \$33K	50%	Invasive, noxious weed control, management, and education	NFWF
Southern Company Longleaf Legacy Program	\$75K - \$250K	50%	Reforestation, restoration, carbon sequestration, land acquisition, biodiversity improvement, thinning, burning, planting	NFWF

Table 12. Habitat Protection Funding Matrix

Habitat Protection Funding Program	Average Project Amount	Match Requirement	Description/Focal habitats/Project type/Keywords	Funding Source
Southern Company Power of Flight	\$20-75K	50%	Research (bird habitat restoration and management; environmental education involving birds, particularly in urban areas; applied research with direct implications for management and conservation, and; nature tourism development.)	NFWF
Southern Rivers Conservation, Southern Mussel Conservation, & Imperiled Southeastern Fish Management	\$10-100K, average \$33K	50%	Mussel, fish, imperiled species, rivers, restoration	NFWF
Aquatic Invasive Species Research & Outreach Program			Aquatic invasive species	NOAA
Coastal Service Center (CSC) Integrated Ocean Observing Systems	\$50K to \$500K	None	Estuaries, partners, monitoring	NOAA
Community Based Habitat Restoration Grants	\$25k - \$85K	50%	Stewardship, habitat conservation, grass roots	NOAA
Coastal and Estuarine Land Conservation Program	\$36.7 nationally in FY 2003	None, but preferred	Protection of coastal land and estuaries, especially land threatened by conversion	NOAA
National Estuarine Research Reserve Land Acquisition and Construction Program	\$50K to \$3mil	30% on construction grants and 50% on acquisition	Land acquisition for NERRs, estuary, NERR construction	NOAA
Conservation Innovation Grants (CIG)	up to \$75K	50%	Agriculture, water resources, soil, atmosphere, grazing land and forests, wildlife habitat	NRCS
Conservation Security Program (CSP)	Payments based on three tier levels of management, up to \$45K/year	None	This program is a reward program to landowners that have historically practiced good stewardship on their agricultural lands and only in designated watersheds that are announced annually.	NRCS
Environmental Quality Incentive Program (EQIP)	Set amount is offered per acre by conservation practice	50%	Agriculture, water resources, soil, grazing land and forests, wildlife habitat	NRCS
Farm and Ranchland Protection Program	Allocated to states based on farmland protection plans submitted to NRCS	25%	Allows the USDA Commodity Credit Corporation (CCC) to cooperate with State, Tribal, and local governments to acquire conservation easements or other interests in prime, unique, or other productive soil to limit conversion of this land to nonagricultural uses.	NRCS
Conservation Reserve Program	A set \$\$ amount is offered per acre by conservation practice, plus rental rates based on soils	50%	Provides annual rental payments and cost-share assistance to establish long-term vegetative cover to improve water quality, control erosion and enhance wildlife	FSA
Conservation Reserve Enhancement Program	\$53.6 million nationally in FY 2003.	25%	Allows the USDA Commodity Credit Corporation to enter into agreements with States to use the Conservation Reserve Program (CRP) to cost-effectively further specific conservation and environmental objectives of that State and the nation. CREP targets Federal and State resources to specific geographic regions of particular environmental sensitivity over a 10- to 15-year period.	FSA

Table 12. Habitat Protection Funding Matrix

Habitat Protection Funding Program	Average Project Amount	Match Requirement	Description/Focal habitats/Project type/Keywords	Funding Source
Grassland Reserve Program	\$254 million nationally in FY 2004; Individual application through local NRCS	25%	The Grassland Reserve Program makes available \$254 million for the enrollment of up to 2 million acres of grasslands, forbs, or shrublands in contracts, Easements, and restoration agreements to protect against landscape fragmentation.	NRCS
Wetlands Reserve Program (WRP)	Program pays roughly \$2,000/acre for qualifying land	0-25%	Wetlands, easements, restoration	NRCS
Wildlife Habitat Incentive Program (WHIP)	\$5K unless a wetland project	25%	Plant habitats, longleaf pine systems, endangered species, riparian buffers, upland hardwoods, wetlands	NRCS
Ecological Biology	Up to 500K	none	Research	NSF
Ecosystem Science	Up to 500K	none	Research	NSF
Strategic Environmental Research and Development Program	\$500,000	None, but preferred	Endangered species, military lands stewardship, compliance, and remediation	SERDP
Forest Legacy Program	TBD; \$3 million available statewide FY06	25%	Land acquisition; easements	USFS through GFC
Forest Stewardship Program	(\$830k state-wide in FY04)		Education and information, prepare management plans. For non-industrial private forest lands.	USFS
Forestland Enhancement Program	Funding significantly cut FY05	25%	On-site management of private forest lands	USFS
Forestry Research	Avg. \$35K; Range \$2K-300K		Research (basic and applied e.g. fire, wildlife, fish, water, watershed, ecology, management, protection)	USFS
Tripartite Timber Sale Exchanges	Variable			USFS
State and Tribal Wildlife grants	\$57 million distributed to states in FY 2003; Funds allocated to states by formula	50%	Supports state fish and wildlife agency programs to benefit wildlife and habitat; may be to purchase state interests in lands	USFWS
Dingell-Johnson/Wallop-Breaux Sportfish Restoration	\$275 million nationally in FY 2003; funds allocated to states based on land and water area and licensed fishermen	25%	Funds sport fish restoration, boating access, and other projects that improve sport fishing opportunities and riparian, riverine, limnetic, or coastal habitat.	USFWS
Cooperative Endangered Species Conservation Fund/Section 6	Variable	25%	Endangered species, acquisition, stewardship, planning	USFWS
National Coastal Wetlands Conservation Grants	\$75,000 to \$1 mil	50%	Wetlands, acquisition	USFWS
North American Wetland Conservation Act Standard Grants	\$50,001 to \$1mil	50%	Wetlands, acquisition, restoration, enhancement	USFWS
Partners for Fish and Wildlife Program	Up to \$25,000/project - renewable	50%	Restoration, private lands, wetland hydrology, planting, aquatic habitats, prescribed burning	USFWS

Table 12. Habitat Protection Funding Matrix

Habitat Protection Funding Program	Average Project Amount	Match Requirement	Description/Focal habitats/Project type/Keywords	Funding Source
Pittman-Robertson Wildlife Restoration Program	\$179 million in FY 2003; allocated to states based on land area and licensed hunters	25%	Land acquisition, wildlife surveys/inventories, research, wildlife management	USFWS
Hazard Mitigation grant program	Variable	25%	Federal funds help acquire land and structures located in frequently flooded areas thus ending the repeated federal payment of flood hazard insurance	FEMA
Transportation Equity Act for the 21st Century (TEA21 Transportation Enhancements)	\$648 million nationally in FY 2003; allocated to states based on 10% of surface transportation spending plus Congressional earmarks.	Previously none required, generally 25% or more encouraged and 20% may be required	Generally for mitigation of highway construction impacts and scenic easements	FHWA
Transportation Equity Act for the 21st Century (TEA21 Recreational Trails)	\$50 million nationally in FY 2003; allocated to states, half by equal shares and half by off-road vehicle use	20%	For purchase of land for trails; trail construction, education	FHWA
Safe Harbor Agreement funds	Approx. \$15 million nationally?	none ?	Provides funds to landowners who enter into formal safe harbor agreements designed to protect federally listed threatened and endangered species on their land	USFWS
Habitat Conservation Plan Implementation grants	Avg. grant size \$4-600K, up to \$1 million on a competitive basis.	25-50%	Provides funds for the implementation of formally approved Habitat Conservation Plans	USFWS
Land and Water Conservation funds (federal and state-level)	Variable	50% if not line item appropriation	To fund land acquisition for addition to national parks, forests, and wildlife refuges as well as state and local public land	Congressional appropriations
Private Stewardship Grant Program	Variable	10%	Stewardship, endangered species, private land	USFWS
Bobwhite Quail Initiative	Variable	none	Provides financial and technical assistance for enhancement of habitat on private lands for northern bobwhite and associated species	State funds
Wetland and stream mitigation	Variable; currently \$2.9 million in Georgia Wetland Trust Fund	variable	Restoration, enhancement, preservation of wetlands and streams	Army Corps, FHWA, GDOT, Georgia Wetland Trust Fund
Carbon sequestration	Variable	none ?	Reduction of atmospheric carbon dioxide through sequestration in growing plants	
Land Exchange	Variable	comparable value	Provides protection for high priority habitats by exchange of land for property of comparable value	
Private Funding	Variable	variable	Private foundations and individual donors often provide critical funding for protection of high priority habitats.	Blank Foundation, Turner Foundation, Woodruff Foundation, Doris Duke Foundation

Table 13. Required Best Management Practices

Goal	Conservation Action	Type	Ongoing or Proposed	Focal Species/Habitats	Ecoregion(s) (SA-RV, BR, PD, SP, SCP, All)	Watershed (HUC8)	Funding Source(s)	Lead Organization(s)	Partners	Function	Measure of Success
Protect High Priority Habitats	Required BMP: Stormwater runoff control from construction sites; Erosion and Sedimentation Control	Regulation - O.C.G.A. 12-7-1 and R&R 391-3-6-.16 and R&R 391-3-6-.22 and NPDES General Permits GAR100001 thru 100003 and Land Disturbance Activity Permit.	ongoing	Aquatic and Terrestrial species	All	All	Land Disturbing activity fee (O.C.G.A. 12-5-23(a)5 and R&R 391-3-6-.22)	Site developers disturbing land greater than or equal to 1 acre, local Gvts, local Gvts issuing authorities, GSWCC, EPD.	Developers, property owners, neighborhood/watershed associations	Reduce runoff pollution from construction sites. Control soil erosion and the movement of sediments into state waters or onto state land from practices in land clearing, soil movement, and construction activities.	BMPs meet hydraulic design specifications contained in the "Manual for Erosion and Sediment Control in Georgia ." If specifications are not met, discharge from the site where land-disturbance must not increase in turbidity more than 25 NTU for warm water streams and 10 NTU for cold water (trout) streams or the individual is in violation of the law (O.C.G.A. 12-7-6)
Protect High Priority Habitats	Required Training on BMPs: Erosion and Sedimentation Control	Regulation - O.C.G.A. 12-7-19 and Land Disturbance Activity Permit	ongoing	All	All	All	Land Disturbing activity fee (O.C.G.A. 12-5-23(a)5 and R&R 391-3-6-.22)	Site developers disturbing land greater than or equal to 1 acre, local Gvts, local Gvts issuing authorities, GSWCC, EPD.	All persons involved in land development design, review, permitting, monitoring, or inspection	Education all persons involved in any land-disturbing activity about laws, requirements, processes, and latest means and methods used to control erosion and sedimentation of state land and water.	
Protect High Priority Habitats	Required BMP: Stormwater runoff control for industrial sites	Regulation - R&R 391-3-6-.16, NPDES General Permit No. GAR000000	ongoing	Aquatic and Terrestrial species	All	All		Industries operating under specific SIC codes and/or activities listed in the Permit.		Reduce runoff pollution from industrial areas.	Development and implementation of a Stormwater Pollution Prevention Plan.
Protect High Priority Habitats	Required BMP: Stormwater runoff control for municipalities.	Regulation - R&R 391-3-6-.16, NPDES General Permit No. GAG610000, and NPDES Permits GAS000101 Thru GAS000144, and NPDES Permits GAS000200 thru GAS000212.	ongoing	Aquatic and Terrestrial species	All	All	In some areas, work is funded by a stormwater utility	EPD and Local Gvts. Large, medium, and small municipalities.	ARC	Reduce runoff pollution from commercial, industrial, and residential areas and to control illegal or improper discharges to municipal sewer systems.	Development and enforcement of stormwater management programs that include adoption of ordinances and public education activities. Submittal of annual progress reports to EPD.
Protect High Priority Habitats	Required BMP: 25ft. Stream Buffer protection	Regulation - O.C.G.A. 12-7-6.b.(15)	ongoing	Aquatic and Terrestrial species	All	All		EPD	Developers, property owners, neighborhood/watershed associations	Protect water quality and aquatic habitat and maintain a natural canopy to shade the stream bed	No land-disturbing activities conducted within 25 horizontal feet of the wrested vegetation of the stream.
Protect High Priority Habitats	Required BMP: 50ft. Stream buffer protection	Regulation - O.C.G.A. 12-7-6.b.(16)	ongoing	Aquatic and Terrestrial species	BR, PD, SA-RV	Watersheds with cold-water trout streams		EPD	Developers, property owners, neighborhood/watershed associations	Protect water quality and aquatic habitat and maintain a natural canopy to shade the stream bed to maintain designation as a "trout stream"	No land-disturbing activities conducted within 50 horizontal feet of the wrested vegetation of the stream.
Protect High Priority Habitats	Required BMPs: Metropolitan North Georgia Water Management District Requirements	Regulation - O.C.G.A. 12-5-571 et sec	ongoing	Aquatic and terrestrial	PD	Chattahoochee, Etowah, Flint, Ocmulgee, Oconee, Tallapoosa	State and Federal funds, Local gvt. Fees	Metropolitan North Georgia Water Planning District, ARC, EPD	16-counties in Metro Atlanta Region	Protect water quality in and downstream of the region, protect recreational values of the waters in and downstream of the region, and minimize potential adverse impacts of development on waters in and downstream of the region.	Implementation of plans and adoption of 1) model ordinances 2) stormwater control BMPs (See Watershed Management Plan, Water Supply and Water Conservation Plan, Long-Term Wastewater Management Plan, at www.northgeorgiawater.org)